

WHAT IS CLAIMED IS:

1. A magnetron comprising:

- an anode comprising plural vanes whose one end is fixed on  
5 the inner wall of a cylindrical anode shell and their inner ends opposite  
to the one ends are radially extended toward the center of the anode  
shell, and of plural hollow confined spaces formed between adjacent  
ones of the plural vanes;  
a cathode provided at the center of the anode; and  
10 a pair of pole pieces arranged at both sides of side surfaces of  
the vanes in such a manner that a magnetic field nearly parallel to the  
cathode can be applied on the interaction space where the inner ends of  
the vanes and the cathode face with each other;  
wherein at least one of the pair pole pieces is so positioned  
15 that an inner end of the pair of pole pieces is within  $0.015 \lambda$  from the side  
surfaces of the vanes in the range extending from the inner ends of the  
vanes to a point at least  $1/3$  of the vane length;  
wherein  $\lambda$  is the oscillation wavelength of the magnetron, and  
said vane length is a distance from said one end to said inner end  
20 wherein the vane length is a distance from said one end to said  
inner end.

2. A magnetron comprising:

- an anode comprising plural vanes whose one end is fixed on  
25 the inner wall of a cylindrical anode shell and their inner ends opposite  
to the one ends are radially extended toward the center of the anode  
shell, and of plural hollow confined spaces formed between adjacent

ones of the plural vanes;

a cathode provided at the center of the anode; and

5 a pair of pole pieces arranged at both sides of side surfaces of the vanes in such a manner that a magnetic field nearly parallel to the cathode can be applied on the interaction space where the edge parts of the vanes and the cathode face with each other;

10 wherein between a surface adjacent said inner ends of said at least one of the pair pole pieces and said side surfaces of said vanes, there are provided metal pieces in a position within  $0.015 \lambda$  from the side surfaces of the vanes in the range extending from the inner ends of the vanes to a point at least  $1/3$  the vane length;

wherein  $\lambda$  is the oscillation wavelength of the magnetron;

wherein the vane length is a distance from said one end to said inner end.

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3. A magnetron comprising:

an anode comprising plural vanes whose one end is fixed on the inner wall of a cylindrical anode shell and their inner ends opposite to the one ends are extended radially toward the center of the anode shell, and of plural hollow confined spaces formed between adjacent 20 ones of the plural vanes;

a cathode provided at the center of the anode;

and a pair of pole pieces arranged at both sides of side surfaces of the vanes in such a manner that a magnetic field nearly 25 parallel to the cathode can be applied on the interaction space where the inner ends of the vanes and the cathode face with each other;

wherein the inner ends of the pole pieces or the metal pieces

are arranged as opposed to the side surfaces of the vanes so that the resonance frequency of the mode resulting from the space between the side surfaces of the vanes and surfaces adjacent the inner ends of the pole pieces can be a frequency between the  $\pi$  mode and the  $\pi - 1$  mode.

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4. The magnetron of Claim 4, wherein the surfaces adjacent the inner ends of the pole pieces or the metal pieces are arranged as opposed to the side surfaces of the vanes so that the resonance frequency of the mode resulting from the space between the side 10 surfaces of the vanes and the surface adjacent the inner ends of the pole pieces can be a frequency within 250 MHz from about the lower limit of the frequency of the  $\pi - 1$  mode.